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C O M P O U N D F R A C T U R E S,

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A C O M M E N T on Dr. BILGUER's Book on
this Operation.

T O W H I C H I S A D D E D A
S h o r t E S S A Y on the Use of O P I U M in
M O R T I F I C A T I O N S. K.

By THOMAS KIRKLAND, M. D.
M E M B E R of the M E D I C A L S O C I E T Y at E D I N B U R G H.

Veritatem volo, præterea nihil.

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T H O U G H T

A M O N G T H E M

S U B J E C T S

C O N T A I N E D

A L L T H E M

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A L L T H E M

A L L T H E M

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P R E F A C E.

WHEN I published my Letters on Compound Fractures, I did what appeared to me necessary and proper; and seeing writers in general have misunderstood Dr. Bilguer on amputation, I have, from the same motives, taken pains to set him in the light he ought to be placed, that his book may not be entirely neglected, and thrown aside, and the community deprived of some benefits that may be derived from his publication. Indeed it must be confessed, that Dr. Bilguer, if the translation is right, has not expressed his meaning so clearly as it might, or ought to have been done; and for want of a full explanation, has set a face upon his writings, which, at first sight, makes an unfavourable impression; nor can he be rightly understood without a thorough examination, and comparing one part with another. The title-page prefixed by Dr. Tissot is not a translation of Dr. Bilguer's title-page, is no ways apposite to the contents of his book, and tends to mislead the reader.*

* *Dissertatio inauguralis Medico-chirurgica de Memborum Amputatione, rarissime administranda, aut quasi abroganda, &c. Which is translated, A Dissertation on the Inutility of the Amputation of Limbs.*

Perhaps

iv P R E F A C E.

Perhaps it has hence been read with a prejudice natural to an apparently inconsistent proposition; or it may probably have been only dipped into, or skimmed over, as unworthy of notice. Otherwise, it is impossible to account for some gross misrepresentations, which must appear liable to censure. From the disguise in which Dr. Bilguer's book appears, I own I mistook his meaning, with respect to his indiscriminately forbidding amputation, when I wrote the Introduction to my Letters on Fractures; and I am glad of an opportunity of doing him that justice his merit deserves. The short Essay on the Use of Opium in Mortifications, is intended as an addition to what has already been written upon this subject.

E R R A T A.

Page 16. note, for Warren, read Warner. P. 30. line 2. after contusion, add of. P. 34. l. 27. for it is, r. is it. P. 39. l. 2. for efficacēs, r. efficacies. P. 45. l. 26. for this, r. the. P. 46. note, for armēt, r. armament. P. 56. l. 22. dele after. For anastomosing, r. anastomosing. For schirrhous, schirrho, and schirrhous, r. scirrhous, scirrhi, and scirrhus.

THOUGHTS

T H O U G H T S
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SURGERY, properly so called, has, no doubt, been much improved in this century; and the medical part of this branch of the profession has been simplified in some instances with advantage, but in others, so much as even to throw away many valuable and necessary parts of practice, along with the rubbish. It may clearly be demonstrated, that the cure of external diseases by medicaments has degenerated, as attention to performing manual operation has taken place; and that these distinct-offices do not always, as they ought to do, go hand in hand. However, it must be confessed, we have reduced the trouble in curing many accidents, by reversing the plan of the ancients. The old surgeons, in their description of diseases, &c. very properly first considered the means of preserving limbs, in accidents where there was any probability of succeed-

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will seem to have given rise to the doctrine, which opposes precipitate amputation; and in matters of science, truth ought not to be represented as a cloak for malevolence. Yet, perhaps, the above reasons in favour of amputation may be eagerly followed far and wide, by those who pay implicit obedience to the authority of great names.

Nevertheless, it is not from a great or little name, that a judgment of men's opinions should be formed; but as they are right, and accord with truth; of which we should judge by plain and simple facts. No man, in general, is more to be believed than Hippocrates; and yet when he tells us, that if a tendon is cut asunder, it will not grow together again, we know he was mistaken, owing perhaps to his proceeding upon an ill-founded general opinion, to his not being acquainted with the right way of managing this accident, or to his being led to make an unfavourable prognostic, from his patient being placed under very unfavourable circumstances. And it is not very unlikely, that the dreadful account we have had of the event of bad compound fractures, where amputation does not take place, may be owing to some of these causes.

Now, that amputation stands upon as fixed and as rational principles as any part of surgery, and that it will ever be a useful and necessary remedy, under certain circumstances, cannot be denied; but that it might frequently have been dispensed with, where it has been employed, is, I

believe, equally true. Those therefore, in my opinion, have done right, who have endeavoured to persuade practitioners against precipitately performing this operation, especially as operations, it is said by those who have opportunities of knowing, are the great, and almost only object, students in surgery pursue: and because they were taught to believe, that unless amputation was immediately performed in *bad compound fractures*, a mortification, or a large suppuration, with formation and lodgment of matter, which would hazard the life of the patient, and frequently kill him, would be the consequence, without a line being drawn betwixt those cases; where amputation is, and is not necessary. Wherefore, we will attempt to supply this deficiency, that what we have already written upon this subject may not, from any thing that has since been said, appear to be groundless and vain.

When a limb has by any means received so violent an injury, that the bones are shattered to pieces, and the muscles and ligaments, &c. are so bruised and torn, that, the vessels being destroyed, there is no possibility of a future circulation in the part, or that, though capable of being kept on, would at last be useless, after a long and hazardous cure, it has generally been thought right, and I believe it is right, to remove it immediately. The only objections of force are, that it is unnecessary to remove it by cutting through the sound parts, and that the patient much seldomer recovers, when the operation comes upon the back of the
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the accident, from the united shock given to the nervous system, than when it is delayed some time *. On the other hand, there are many well known reasons for a contrary procedure; and in the few cases I have met with, in which the operation was immediately necessary †, from the violence of the injury, I have followed the practice of taking off the limb in the common way, as soon as I could, and with good success. Even Dr. Bilguer amputates in these instances; and we will just enquire into his mode of proceeding.

Indeed, as what he says is manifestly delivered with a good intention, and is the result of uncommon public experience, it ought, I think, to be attended to. His situation afforded him the most desperate and proper cases for trial; and though his intentions of cure might be pursued with more eligible remedies, yet he is, no doubt, a most able surgeon, and we cannot see any reason for rejecting his opinion with contempt, except we mistake his meaning, and suppose that he condemns the practice of removing diseased or injured limbs, by an operation, in all cases whatever.

* See Mr. Boucher's paper on gun-shot wounds, Mem. Royal Acad. Surg. Paris, vol. ii. Neal's Transf. p. 285.

† Excepting the fingers, I have only met, in my own practice, with three instances. Two happened from the bursting of guns, which tore the hand and wrist all to pieces. The other was in a compound fracture of the leg, in a man eighty years of age, and in which the injury was of that kind, that there was no possibility of keeping the leg on. And I met with another instance, under the care of another gentleman.

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The principal aim of his book is to shew, “*That parts which have sustained the most considerable injuries, will much oftener get well, than what is commonly believed.*” Of course he amputates but very seldom; never, if possible, in the sound parts, on account, as he says, of the needless pain that accompanies it; and as it is not done in the usual way, he thinks it cannot be called amputation. Wherefore, when he says amputation may be *almost totally dispensed with*, he means *amputation in the common manner*. And though the patient lose his limb, yet the manner of losing it makes a material difference to him. In the common way, when the operation is performed in the sound parts, horrid pain, and a dangerous shock to the habit, are unavoidable consequences. In the other, danger of fresh injury from an operation is avoided, and little or no pain is added to the accident, which are circumstances that will ever have their due weight with men of feeling.

Dr. Bilguer endeavours to demonstrate, “*That the cases wherein amputation is necessary are much less frequent than has been hitherto supposed; and that it may even be almost totally * dispensed with.*” And for this purpose, he begins with enumerating those *accidents* for which amputation has hitherto

* I have never seen the original, but suppose the word *totally* is a stronger expression than the text warrants, because in the title-page which Dr. Tiffot copies, we see he uses the words, *aut quasi abroganda*.

been deemed necessary, and these he reduces to six instances ; but he means not to shew, as has been represented, that amputation is totally and absolutely unnecessary, and wrong in them.

First, *A mortification which spreads until it reaches the bone.* Or, (to explain this text) Mr. Sharp says, “ A *spreading mortification* has been “ always looked upon as so principal a cause for “ amputation, that it is a fashion with all writers “ to treat of the nature of a gangrene, previous “ to this operation ; and I think they have all “ agreed, that whatever the species of it be, if “ the remedies they prescribe do not prevent “ its progress, the limb must be amputated.” Which doctrine he rejects, and proves, that amputation should not take place till the mortification is stopped. Dr. Bilguer’s meaning is exactly the same ; and when he tells us, section the seventh, that his treatment of mortified limbs has convinced him, that amputation is not necessary *, he certainly only means, that it should not be employed *to stop the progress of the disease.* It is evident, this improvement in practice had not taken place in Prussia when he wrote : he surely did a good office in teaching it. He says, he does not condemn the amputation of what is absolutely mortified, but only contends, that it

* This passage will appear to be a wrong translation, and that it ought to be read in the manner we have corrected it, if we compare it with what is said in the 35th, 36th, and 37th pages of his book.

should

should not take place while the disease spreads, or while the patient is feverish; and proves, from observation, that the greatest number of successful cases happened, when amputation was performed late, and when the disorder had abated naturally. He accordingly attempts to stop the progress of the disease, by external and internal remedies, (which he describes from the 9th to the 35th page) instead of amputation; and when this point is accomplished, he considers whether the limb can be preserved or not. If not, he takes it off, either by cutting through the sound, or mortified parts, as the particulars of the case require; for if the patient is very weak, and incapable of undergoing an operation, he lops off all the useless mass near to the quick, without touching it, and afterwards endeavours to stop the progress of the infection by internal medicines, suitable dressings, and a strengthening regimen; and after a separation betwixt the dead and living parts has taken place, he saws off the bone. And would not most men in their senses act *nearly* in the same manner, as cutting through the parts above, which are probably in a more irritated state than ordinary, may bring on a variety of ill consequences, or even death? The case quoted by Dr. Tissot, from Mr. Ranby* on this occasion, is exactly in point; for the Austrian officer died with the *tetanus* in consequence of amputation, after the mortification had stop-

* On Gun-shot Wounds, p. 70.

ped; and who would probably have lived, had the bones only been sawed through, betwixt the living and dead parts. I have constantly, for many years, followed this practice, whenever I had occasion to remove a mortified limb; and I lately met with a very good instance, in support of such procedure. A woman had a mortification seized her hand and wrist, from violence of inflammation, and spread itself within three or four inches of the elbow, before I saw her. However, it now luckily stopped; and besides the dressings to the ulcer, we applied antiseptics to the dead parts, to prevent their giving us trouble. The surgeon, and the relations of the woman, now wished to have the arm taken off above the elbow, but I pointed out to them some inconveniences, which I had seen from cutting through parts lately inflamed; and that we should make equally as good a cure, by sawing through the dead bone, as by performing a painful, unnecessary, and hazardous operation. Accordingly, waiting till there was sufficient room for the saw, we cut through the bone, without pain, or without giving the least fresh trouble to the patient. The skin, and some of the muscles, being left lower, on the back part of the arm, the surgeon turned them up over the bone by degrees, and made, much to his satisfaction, a very good cure. I am very certain, every humane man, after making the experiment, will think the only exceptionable part of what Dr. Bilguer has said

about amputation in mortified limbs, is, his operating sometimes in the sound parts.

Secondly, *Any limb so greatly hurt, whether by fracture, or dilaceration, that there is room to dread the most fatal consequences, a mortification, and death.*

This article he considers in two points of view; where there is no probability, and where there is a probability, of saving the limb. If it is so shattered and torn, that there is no probability of saving it, he cuts it off by dividing the injured parts, that keep it hanging together, which have very little feeling. He then saws off the ends of the bones, carefully removes all splinters, and having reduced it to the state of a simple contused wound, he dresses it with digestives, &c. And may not much pain to the patient be saved, and a good cure be made, in a multiplicity of instances, by this treatment? Would Wiseman * have recommended this very practice, had it not answered his end? When the fingers are so mashed, that they cannot be kept on, we frequently make good cures by this method; and I do not see any reason, why it will not in general hold good in other instances.

But these desperate cases in compound fractures, requiring immediate amputation, if I may judge from plain matter of fact (except made by gunshot) are indeed very few. I have only seen two of them in full forty years practice. Mr.

* Book 6th, chap. 5th.

Gooch, who saw a great deal of business of this sort, in a longer period, was equally fortunate, as he informed me by letter; and almost all the surgeons within the circle of my acquaintance, who have been properly initiated in business, are happy enough to be in the same predicament, notwithstanding many of them have not wanted sufficient opportunities of experience. And Wiseman, who presses immediate amputation in gunshot wounds of the joints, never once mentions the necessity of this treatment, in compound fractures made by common accidents. The same may be said of Parey, and the chirurgical writers on each side of him, up to Hippocrates and down to Turner, on fractures with comminution. Heister only talks of amputation, when a deep *sphacelus* has invaded the limb: and I can remember forty years ago, that in these accidents in the country, this treatment was seldom or never thought on; whereas the utility of amputation, to prevent misfortunes in bad compound fractures, is the *alpha* and *omega* of a modern book. Perhaps it may be said, that the old surgeons were forced to take pains, and to turn out their patients with useful legs, because they did not cleverly know how to take them off; but had they been as expert with the knife as the surgeons in these days are, they might have saved themselves a great deal of trouble. Nevertheless, if they really could cure them by the methods described, which are very different from those to be met with in modern books, this art in some places may be said to be

lost. The injury, where immediate amputation is required, is of that violent nature, that it cannot be mistaken; the destruction of the parts, and the impossibility of their being saved, is evident at first sight. All surgeons have agreed to amputate under such circumstances; even the unexperienced cannot be mistaken, and any excitement to this work is quite unnecessary. There is no doubt, but mortification, and perhaps death, might be the consequence of not amputating in such instances; but as they so rarely happen, I am sorry to see pictures of death and destruction frequently hang out, because they may strike a dread on young practitioners, and prevent their attempting the preservation of limbs, where there is a probability of success. I am persuaded however, writers have acted as success directs them; and we shall also proceed upon the same principles.

But the accidents just mentioned are not those in dispute; and if it is insisted on, that these are the certain circumstances under which speedy amputation in compound fractures is proposed, we are getting off part of the ground upon which we first stood, and the writers against speedy amputation seem to be gaining their point; for *bad* and *bazardous* compound fractures, and fractures of the *fibula*, with a compound dislocation of the *tibia* at the angle, were heretofore included in the number of cases requiring this treatment; and we know it was an usual practice, where the bone was shattered, and made its way through a large wound,

wound, and where the muscles, &c. were considerably bruised and torn at the same time, to whip off the member, because there was more hazard in attempting to preserve the limb, than in taking it off. Or even in cases where much less injury was done, the epithets *bad*, and *bazardous*, without full explanation have a very vague meaning, and give a most unwarrantable latitude of using the knife, to timid and ignorant men; for those who have not made the medical *, or as some call it, the curative part of surgery, the chief object of their attention, do not know how to encounter difficulties and discouragements, and being fearful of success, have recourse to that method, which requires but very little trouble and skill; and accordingly, many accidents barely coming within this description, have, I am persuaded, never been suffered to undergo any attempt in a different method of cure: and yet it is a notorious fact, that in the cases we have just enumerated, in pure air, and under proper treatment, high fever, intense inflammation, gangrene, and mortification, very seldom happen; that the patients do not often perish by means of their wounds, and that they are almost constantly cured, when *well* managed, without amputation.

In regard to compound dislocations of the *tibia* at the ankle, from what I have seen since I wrote

* By medical surgery we mean the dressing of sores, the hand and medicaments both being employed at the same time.

on this subject, I do believe, when the head of the bone is removed, that a mortification, or indeed any other dangerous symptom, so rarely happens, that the mentioning of them here may be said to be out of place; and that whatever alarms, and thereby prevents an attempt to preserve the limb, leads us from that method, which ought to be pursued. A limb, when it has received a very bad compound fracture, may not be so violently injured, as to be rendered incapable of being restored to its proper office; for though the circulation through the muscles may, from laceration, have the appearance of being stopped, yet, the lacerated and divided parts being laid together, the vessels very soon inosculate, and a cure follows. Wherefore, we are to compare the injury with the similar accidents; and if, from the aspect of the part, it seems not to be worse than such as have generally recovered, I will be bold to say (and truth may at any time be spoken with boldness, without censure) we ought not precipitately to amputate. Nor is an attempt to save limbs, though violently bruised and shattered, which experience teaches may be cured, repugnant to common sense, or can it be productive of much mischief to mankind. Surely it is right to attempt a cure, where there is some probability of doing it, as we are not to regulate our conduct by considering, whether there is most hazard from amputation, or the accident. For a man will be willing to run some hazard in an attempt to preserve the limb, if there is any likelihood of
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its being saved; and therefore, according to the advice of Wiseman *, we should consider well the member, and only amputate immediately, *where we have no probable hope of a cure.* And who can or dare defend immediate amputation, in any other circumstances?

Among the writers of observations, we find many instances where the patient, not submitting to immediate amputation, even in very desperate compound fractures, a perfect recovery, contrary to all expectation, has happened; fairly evincing, that the steps nature is capable of taking, to restore injuries in the several parts of the body, surpass all kind of reasoning, except that by comparison and analogy; and therefore, those advantages have not been derived from such recoveries, as might have been wished, or expected; it being imagined, they were only escapes, and too extraordinary to be made precedents of. But Dr. Bilguer has shewn the contrary; for of all compound fractures those by gun-shot in general are the worst, and yet when a ball, &c. shatters a limb, that the part may be moved any way, and seems to hang useless, without coming within the former predicament, he makes the wound, or wounds, sufficiently large, lays the bone bare, removes as many splinters as possible, with his fingers and a proper saw, together with all extraneous bodies, and thus brings the wound into as simple a state, as the nature of the injury will permit; and if he was successful in these cases, are they not sufficient

* Book vi. chap. 5.

to prove his first proposition? Almost every man must have seen limbs, which have received a compound fracture, that might be moved any way, and seemed to hang useless*, recover; and I cannot therefore help favouring his opinion. In the coal mines, some years ago, I constantly saw such violent compound fractures recover, which nothing but experience could have induced me to believe. I then first learned, how readily a new circulation would begin, betwixt bruised and divided parts, when laid together: and I wish surgeons would attend to this circumstance, as they will have the pleasure of seeing nature do more than they from reasoning could expect. The immediate inosculation in simple wounds, has always been known, but that the same thing happens in contused and lacerated wounds, I first clearly saw, more than thirty years ago, in a collier's leg, upon which an immense weight of coal had fallen, made several large, lacerated wounds, shattered the bones, bruised, and divided the muscles in a miserable manner. I had before

* The wheel of a loaded waggon run over a boy's leg, just below the *gastrocnemii* muscles; pressed about three or four inches of the *tibia* clean out (both ends being almost as level as if they had been sawed) through a lacerated wound: the *fibula* was mashed to pieces, and the foot, no doubt, seemed to hang useless. Mr. Warren of Leicester, then with me, had the management of the limb, the first dressing; and I never saw a compound fracture cured with so much ease, owing to the simple state it was reduced to, by the entire removal of the bones, the accident having effected what Dr. Bilguer effects by his knife, and saw, &c.

been

been frequently concerned in the cure of limbs, bruised, torn, and shattered by the wheels of loaded waggons, &c. passing over them, but I never had seen so horrid an accident as this of the kind; and imagining it impossible to save the limb, I advised immediate amputation. The man was too much in liquor to say any thing to the proposal: his wife and the coal-bailiff insisted that the operation should not take place, and I began the cure, without hopes of success, by washing out the coal-slack; but the greatest part remained to get at liberty by digestion, being driven into the very substance of the flesh. I then removed all the loose splinters of bone, which could easily be done, there being room enough for the purpose; and then laying all the bruised and divided parts together as well as I could, I dressed the patient in the usual manner. But I was astonished at my future dressings, to see how soon an adhesion in the divided parts, and a new circulation took place, and in short, the coal-slack, which had even given blackness to the muscles, digested out, and the patient was cured with less trouble than I could have imagined, after he returned to his usual way of living; for upon keeping him upon low diet, a few days in the beginning, the ulcer, though it digested kindly enough at first, began to look ragged, and gleeted; he lost his appetite, and had restless nights. But finding he had been a very hard drinker, I ordered him a quart of ale a day; and from this time every thing went on perfectly well, notwithstanding

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ing he exceeded his allowance so much, as to be often fuddled; fairly evincing, that use is a second nature, and that even bad customs must, in some measure, be complied with, or we lose our patient.

From this time I proceeded by comparing in my mind one accident with another; and though the bones were much shattered, the soft parts much bruised, or the wounds large, provided the limb was not in the predicament first mentioned, I never was disappointed in making a cure, that was not much better than a wooden leg. Mr. Rowe had no conception of keeping on the leg in the compound fracture, such as Mr. Mudge * describes; and yet we see with what ease the patient was cured by the fortunate step he took in the beginning, which excluded the air. It is another of those cases, which shew that amputation in these accidents has been oftener performed than was necessary; and, I doubt not, will have its due weight among sensible men †. Nor does the want of success in other people's practice invalidate what Dr. Bilguer has said; because it is not an accidental case or two that he instances, but the experience he delivers to us was gradually accumulated; one step of nature led on to another, till he found she would go farther with assistance than was imagined. His cures were known to a great number of physicians and surgeons in the army; and the multiplicity of desperate compound frac-

* On Catar. Cough, p. 220.

† See also a case in Mr. Clare's book on Abscesses.

cures,

tures, which must of course have happened during a war, which afforded him more than six thousand wounded men at one time, gave him more opportunities of observing facts, than fall to the share of those unconnected with military employment. And should we shut our eyes against this information? The opinions of the ablest surgeons in the world cannot overturn facts: if facts shew us, that more dangerous compound fractures will admit of cure than has been believed, why are we not to attend to them?

After the hæmorrhage is stopped, the worst consequence that can be apprehended, Dr. Billguer says, is mortification, which he is not afraid of, because he expects to prevent it, or to stop its progress when it appears: and instead of acquiescing in opinion, that this cannot be done, it is worth enquiring, whether he has just reasons for such expectations.

When a mortification accompanies a compound fracture, it must arise either from the violence of the injury; from the violence of the subsequent swelling; from the corrosive ichor, occasioned by extravasated blood, &c. stagnating in the part; from a bad habit of body; or from all these causes united: but the three first instances only fall under consideration, as in the latter it can scarcely, I think, be prevented, by taking off the limb, on account of a gangrenous disposition previous to the accident; whereas the former are local, and these he most likely alludes to, when he speaks of success, because local gangrenes are com-

monly flow, as he describes, and there is time for applications to take place, unless they happen very near the body. Others, we know, are of a different opinion, and assert, that mortification in these accidents, when once begun, will be too quick for remedies, and therefore urge the necessity of speedy amputation, to prevent what may not happen; or if it does happen, the odds are greatly in favour of its being local, and not killing the patient. Indeed there is one kind of local gangrene, which is very quick in its progress, and, unless prevented taking place, will soon end in death. It is not peculiar to compound fractures, but happens sometimes in violent contusions, accompanied with a small wound, and does not destroy the patient altogether by acrid matter being absorbed, and bringing on putrefaction, but from its seizing the nerves in the neighbouring parts, and, like the Indian poison, though not so quick, occasions death, by its sedative influence upon the whole nervous system. And this, perhaps, may be said to constitute that very kind of case, in which amputation should have been immediately performed. But who can tell before hand that there is any likelihood of its happening? It very rarely occurs; and were we to prevent it in compound fractures, by amputation, we must cut away without mercy, and do a great deal of that kind of business which ought not to be done. A man had his leg fractured; a wound, more than an inch long, was made by the broken bone being raised through the skin, and

and mortification and death were in a few days the consequence. But who can with propriety say, that amputation should have taken place immediately, to prevent this fatal termination? Nor could it have been justified, for the reasons just given, because compound fractures, thus circumstanced, for the most part recover without amputation, and because the operation is equally dangerous with the accident. However, when I call to mind, that I never saw a local mortification which killed the patient, where the injury made very large openings, I am apt to think, that Dr. Bilguer's being so very free with his knife in the beginning, is a main point in insuring him success; for, unless the wound is of such a nature, that the air may be excluded, its being large gives liberty to the parts, admits an easy extraction of splinters, a free discharge, convenient dressings, and prevents abscesses, &c. I have constantly observed, that compound fractures, accompanied with large, lacerated, and even contused wounds, are cured with more ease, than those where the wound is small, and made only by protrusion of the bone; and I have therefore, where I could not succeed by the first intention, taken care to have sufficient openings: and the question is, whether in compound fractures mortification may not as effectually be prevented by large and timely openings, when necessary, as by taking off the limb?

Dr. Bilguer admits, that every patient was not saved by his method of proceeding; and it is reasonable

sonable to suppose that he lost some, who might have been cured by amputation: but, on the contrary, there is reason to believe, he preserved many limbs, which, in the usual way of going on, would have been cut off. If a mortification made amputation necessary in the end, it was done often without fresh pain, and there remained no doubt whether the limb could have been saved or not.

Of all compound fractures, those of the joints are the worst, because of the consequence of inflammation of the membranes and ligaments, and of the heads of the bone becoming foul, especially when made by gun-shot. Wiseman says, "it was counted a great shame among the surgeons in the navy, if dismembering the patient in this situation was left till next day." And surgeons in general have acceded to this practice, supposing fatal consequences are unavoidable, except by amputation; and perhaps they may have judged right, where the common method is pursued: but if a bullet has made its way into one side of the joint of the elbow or knee, and by that means shattered several bones at one stroke, Dr. Bilguer treats it by dilating the wound, cutting away lacerated tendons, and extracting the splintered bones. He says, the wounds get well, like other compound fractures. This assertion was made in the face of many, who were capable of contradicting him, if false. And is not his evidence much strengthened by Mr. Boucher's papers on gun-shot wounds complicated with fractures,

tures, either at or near the articulation of the extremities * ? And have those who condemn this practice ever tried whether it is right or wrong ? or do they proceed to amputation, from dreading that nothing else can be done, because the common method of proceeding has failed ? Removing the heads of the bone mitigates the subsequent symptoms amazingly. In several instances which have come to my knowledge, where they were taken away through a large contused wound in *one side* of the joint, at the elbow, ankle, and wrist, though the other side was greatly injured, the patients were cured without any symptoms of consequence ; or where the wound was so large, and so situated, that matter could not lodge in the joint, though the ends of the bone were not taken away, they recovered, undergoing pain from neighbouring abscesses, without danger. And it may be worth considering, whether his boldness, in making large openings through the capsular ligaments, and cutting away lacerated tendons, is not an improvement in the art.

Large wounds in the membranes, we know, are not, for the most part, attended with the same trouble as those which are small ; and large openings may be made through them, for the discharge of matter, with safety and advantage. A small wound through the capsular ligament, for instance, in the side of the patella, in the upper part of the knee, may occasion the loss of the limb, or death, by matter forming in the

* Mem. Royal Acad. Surg. Paris.

joint,

joint, &c. but if, when we see matter begin to collect, a depending orifice is made, a train of horrid symptoms will often be prevented, and the recovery of the limb mostly the consequence *. And in all the instances I have seen, where the wound in the joint was so large, that matter could not lodge, a colliquative fever did not supervene; nor did the symptoms of putrefaction in the part rise so high as when the wound is small, owing, perhaps, in some measure, to air not being confined. When, in wounds connected with the tendons, the tendons are entirely removed, all troublesome and dangerous symptoms are prevented, as we learn from Marchettis, 57th observation, where the tendons of the thumb were torn away by the bite of a horse; by similar instances in other writers; and by cutting the tendons away, when we perform amputation just above the ancle. And although by this procedure in wounds of the joints, the action of some part of the limb is abolished, yet it simplifies the injury, and a stiff limb is better than no limb at all.

Nevertheless, though I have said the heads of the bones, at the upper and lower end of the *os humeri*, the upper and lower end of the *radius*,

* It is the business of the surgeon, in such an accident, to prevent, if possible, suppuration, by excluding the air: for there cannot be any doubt, but it is the effect of this fluid which occasions most of the mischief in wounds in the tendons and ligaments, as the different symptoms following a rupture in the *tendo Achillis*, with and without a wound, evince.

and

and *ulna*, and the lower end of the *tibia* and *fibula*, may be taken away in accidents, yet I must confess, I have had no experience myself of this being done in the lower end of the femoral bone; and unless a ball, or any other accident, breaks it off, I do not see how it could be taken away through a wound, without an operation that would be worse than taking off the limb. Perhaps it is from such accidents that Dr. Bilguer's conclusions were drawn, or he may have become expert in an operation, which, for want of practice, appears to us to be difficult; and I would not therefore depend upon reasoning on the nature of things, which too frequently evinces, that we do not understand them. But suppose a case to happen, such as Wiseman describes, where the patient was shot through the knee. "The
 " bullet entered in by the lower and exterior side
 " of the *rotula*, and passing through the joint,
 " out in the hollow of the ham, tore the liga-
 " ments and nerves, and fractured the joint as it
 " passed, rending the artery in going out. There
 " was no possibility of conveying any instru-
 " ment, whereby he might thrust or pull out
 " the shivers, if any such were, between the
 " heads of the joint. Pain, fever, putrefaction,
 " delirium, spasm, and death, were the conse-
 " quences." It may be asked, what but ampu-
 " tation could have prevented this catastrophe?
 According to Dr. Bilguer's method, "making
 " large openings, or perhaps by entirely exclud-
 " ing the air." I would first try this last expe-
 E dient,

dient, as I am persuaded it would be found highly useful in particular cases, in gun-shot wounds. After all, accidents may and will happen to the joints, in which none of these steps can take place with advantage; and if they fall within the description at p. 4, or if a caries of the heads of the bones, or a colliquative fever, cannot be prevented by openings, amputation or death must be the consequence.

But there is another period in compound fractures, in which amputation has been thought indispensably necessary. When the ulcer, instead of contracting, remains as large as at first, with a tawny, spongy, surface, discharging a large quantity of thin sanies, instead of a small one of good matter, when the bones, instead of uniting, &c. remain perfectly loose, and disunited, as at first, and the patient loses his sleep, and has a colliquative fever. But it is a main point in the cure of compound fractures, to prevent this state, otherwise it is almost certain, it will be all over with the patient, and the surgeon will frequently want success, whether he amputates or not. If we begin the cure by reducing the patient's strength much, by free and frequent bleeding, purging, and extreme low diet, it may soon be out of our power to hinder this ill disposition taking place; and when this happens, a generous plan of diet, with the bark and cordials, will mostly come too late. Nor is bleeding, or weakening the patient much, proper or necessary for promoting the digestion of the wound, if the limb
be

be properly managed ; but this cannot always be done, by leaving nature to accomplish her own purpose, without proper assistants. And I do believe, when I see the practice proposed in some books, for the cure of compound fractures, that the reducing, or antiphlogistic treatment, has been longer continued than the injury itself required, to subdue febrile symptoms constantly kept up by dressings, no ways capable of preventing, or assisting to remove inflammation and its consequences.

We should have an eye to the patient's general strength, and to the strength of the affected part from the beginning, instead of having this to do when perhaps it is incapable of being done ; which treatment we have before hinted at ; and this method of proceeding may perhaps be one reason of Dr. Bilguer's success, for, at the very onset, he guards against lowering the patient. He suppresses, and keeps within proper bounds, the discharge from the sore ; and he endeavours to prevent an absorption of matter, and to strengthen the limb by bandages. And I apprehend we shall not lose time, if we just inquire into the propriety of his keeping the injured member surrounded with cloths, constantly moistened with spirit of wine.

I know the use of spirits has been condemned in the cure of gun-shot and other wounds ; and, if applied when the part is in a state of great inflammation, I think they will do harm, because I have known a local *sphacelus*, of considerable extent

tent, brought on by the application of tincture of myrrh to an inflamed wound. However, spirit of wine does not bring an inflammation where the part is not already inflamed; and perhaps, when it is applied round the dressings, before the inflammation comes on, it may have a good effect. It is a powerful sedative, and may render the nerves nearly insensible to irritation, and thus prevent great inflammation, and its consequences.

This remedy has long been recommended in slight burns, and in slight *erysipelata*, as capable of preventing and subduing inflammation; and I have seen it in both these instances, in a very short time, remove all appearance of the disease. I likewise once saw it give the most instant relief in a *slight* inflammation about the anus, from which a clear hot ichor was discharged, attended with excessive itching, and most agonizing pain; all which, I imagine, it produced by lessening, or taking away, the sensibility of the nerves. But I cannot recommend this practice, under the present state of a compound fracture, from my own experience; and therefore, only offer these hints to the consideration of those gentlemen who are disposed to reflect upon Dr. Bilguer's success. If it should be found useful, in bringing about the effects described, we have still more to expect from it, as it will preserve the strength of the limb, prevent a circumstance much to be attended to, large suppuration, and, being a powerful antiseptic, it may do good service by this property. But whatever may be the advantages before inflammation

inflammation is come on, they can no ways recommend its use where it has taken place, nor till sufficient relaxation gives it an opportunity of being applied with safety. And now we are upon the subject of spirituous dressings, we shall advert to the use of tincture of myrrh, &c. which, after being much used in these accidents, is laid aside, because it was said to be applied as a stimulus, to assist nature in throwing off the diseased parts; which is like despising a man who has undeservingly a bad name, without examining into his actions. Nor is this the only instance, by hundreds, where a valuable remedy has been kicked out of doors, from being connected with a foolish theory. But whoever examines into the matter, will find that myrrh, instead of irritating, is a powerful sedative; that it is a good antiseptic; and that, being united with the spirit of wine, it forms a strengthener. Wherefore, being applied in these accidents, after all kind of inflammation is gone off, both together give a natural sensation to the sore, they correct putrid acrimony, render it incapable of acting upon the sound parts, give nature an opportunity of pushing off from the living fibres whatever is offensive, and they crisp up relaxed fibres, and thus lessen the discharge; all which things dressings of this class are known to effect. Nor am I at all surpris'd at those wanting success, who are unacquainted with these circumstances, who leave the whole to nature, and who entirely neglect the principal use that may be made of bandage.

Thirdly,

Thirdly, *A violent contusion the soft parts, which of has at the same time shattered the bones.*

But what does Dr. Bilguer do in this instance? Why, he bleeds, and purges, and endeavours by every means, both external and internal, to promote an absorption of the extravasated blood, &c. and when the swelling subsides, he places the bones in as good a position as he can, and finishes the cure in the common manner. And is this repugnant to the universal sense of all the ablest and best practitioners, to common sense, or to constant experience? Mr. Freke*, above thirty years ago, in speaking of the effects of air in compound fractures, says, " Though the bones, in a
 " simple fracture, be ever so much *macerated*, it
 " seldom or never, with proper care, fails of
 " doing well." Mr. Mudge†, lately upon the same subject, says, " We frequently meet with
 " simple fractures of the leg, where both the
 " bones have been broken with the greatest circumstances of violence, where they have been
 " splintered, where they have been nearly pushed
 " through the skin, and where, by the appearance of the *ecchymosis*, or leakage from the
 " torn vessels, the violence and laceration of the
 " parts have undergone, are sometimes demonstrably as great as they can, and frequently
 " more than they actually do receive in a compound fracture. But notwithstanding all this,
 " if the limb is not injured by motion, or band-

* Art of Healing, sect. 3.

† Catar, Cough, p. 213.

" age,

“ age, but left as nearly as possible to the treatment of nature, it is followed by none of those formidable circumstances which so strongly mark the character of the compound fracture, but usually by the inconvenience only of about six weeks confinement.” Indeed this fact is so very common to those conversant in business, that I am persuaded, from seeing amputation mentioned as the only remedy, there is a misconception of this article ; for I cannot suppose any one to be so very ignorant, as not to know that a bruised and shattered limb, unaccompanied with a wound, will recover with very little trouble : unless they have precipitately taken off all the limbs they have met with thus circumstanced, without giving themselves an opportunity of seeing whether they would recover without amputation or not.

Farther, if the contusion has caused a mortified slough, and has at the same time shattered the bones, Dr. Bilguer separates the dead sloughs from the sound parts with a knife ; so that his digestives, &c. may have proper effect ; and digestion being promoted, the treatment common to a compound fracture takes place. And would not every sensible man first try this method, which was recommended in the days of Celsus *, under similar circumstances, instead of proceeding to a slapdash operation ?

“ Fourthly, *Wounds of the larger vessels which convey blood into the limb, either as the only means*

* Lib. vii. cap. 10.

" of stopping the hæmorrhage, or through the apprehension the limb should perish for want of nourishment."

Dr. Bilguer says, with respect to the crural artery at the upper part of the thigh, whether tying the vessels can or cannot be adopted, there is no alternative, no surgeon, as far as he knows, having ventured to perform amputation at this part, lest the patient should expire under the operation*. Neither would the wounds of the brachial artery induce him to take off the arm at its upper part, although it be practicable, because he thinks every expedient ought to be tried, before we have recourse to this method. And as the arm recovers after the operation for the aneurism, when the trunk of the brachial artery has been cut through, he thinks when it is wounded, we ought to tie it without fear, then provide for the preservation of the limb by proper applications, carefully watching the subsequent symptoms; and if, whatever is below the wound shri-

* Dr. Bilguer's idea of taking off the thigh at the articulation with the hip, to prevent a stump, is a reverie he never intended to be put into execution; because he prefers, in this place, abandoning the patient to his fate, rather than to amputate in the upper part of the thigh. And thus much may be said in favour of Dr. Tiffot, about taking off the thigh at the hip, to stop with greater ease the hæmorrhage of the crural artery, that in the operation of amputating the thigh at the upper articulation, lately performed by Mr. Kerr, the crural artery was easily tied, without the loss of a single drop of blood. However, we do not mention this to recommend so horrid an operation.

vels,

vels, grows cold, and dry, we may think of amputation, without, however, being precipitate, as a mortification in this case is always slow, and sometimes the limb recovers heat and motion very late; and (he says) he is convinced this case will very rarely require amputation. In support of this opinion, his translator, Dr. Tissot, endeavours to shew from anatomy, that unless the crural artery is wounded, almost at its egress from the arch formed by the tendons of the abdominal muscles, its being destroyed will seldom occasion the loss of the limb, because the branches going off from the main trunk, anastomising with it below the wound, would carry on the circulation. He says, experience demonstrates, that this happens in the arm, and he thinks it is highly probable the same thing may happen in the thigh, because the distribution of the vessels of both limbs are analagous; and he observes, in some curious dissections of dead bodies, *the crural artery has been found quite obliterated in the upper part of the thigh*, in consequence of a morbid cause, without the leg having been deprived of its nourishment, though supplied, perhaps, more imperfectly.

Sed audi alteram partem.

“ The above doctrine is so repugnant to the
 “ universal sense of all the ablest and best prac-
 “ titioners, to common sense, and constant expe-
 “ rience, that, if followed, would be productive
 “ of much mischief to mankind,” because mor-
 F tification

tification and death are certain consequences in some kinds of aneurisms of the thigh, if the vessel be tied. Which, in my opinion, are reasons that no way invalidate what Dr. Bilguer has said ; because a recent wound in an artery, and aneurisms, are very different things. But as the subject is important, let us give it a fair hearing.

If it is insisted on, that by vessels which convey blood into the limb, is meant the humeral, or femoral artery, before it sends off any collateral branches into the limb, we must observe, that these seem not to be parts of the vessel Dr. Bilguer alludes to ; nor does it appear that he has had experience in these desperate cases ; probably because the patient had bled to death before any surgeon could come to his assistance. He particularizes the interosseous, the brachial, and crural arteries, near the articulations of the elbow, or knee ; and says, when these are divided, it is not necessary to take off the limb, because, by proper dilatations, &c. the bleeding may be stopped *. When he speaks of a wound in the trunk of the brachial artery, at the upper part of the arm, he manifestly means after the collateral branches are sent off ; because, by comparing it with the aneurism, it is plain he depends upon their carrying on the circulation ; otherwise ~~it~~ is not probable he ^{it} would have talked of the artery just at its coming out of the axilla, instead of the part he describes ?

* It appears to me, that it had been usual among the Prussian surgeons, to take off limbs on account of these vessels being wounded.

And,

And, in my opinion, it is only wounds in the trunks of the arteries, after they have sent off branches into the limb, that falls under present consideration.

Now, it has long been known, that when a wound in the humeral artery has been made by bleeding, it is considerably above its division near the elbow, of course the nourishment of the limb below must be accomplished by collateral branches higher up; and though a ligature be made much higher, they will still do the same office, as we learn from the practice of an eminent surgeon*, who assured Mr. Cheselden, that he had tied up the trunk of the artery, in the middle of the arm, in men wounded in battle, and that the limbs perfectly recovered. Mr. Revans, by the desire of Mr. Gooch, tied the artery in the middle of the thigh, of a full grown young spaniel, including in the ligature, by design, the vein and nerve, but without inconvenience. For though any pulse could not at first be discovered below, yet, excepting a little cedematous swelling, no interruption happened during the cure; and upon dissection, a month after the dog was perfectly recovered, the ramifications of the branch going off above the ligature were found much enlarged, comparing them with the vessels in the other limb; and the space between the ligatures was filled up with an impervious carnous sub-

* Le Dran's Operat. p. 456.

stance †. Indeed I am fearful wrong conclusions, drawn from anatomy, have here (as in other instances)

† The following case, communicated by Mr. Clover of Norwich, to Mr. Gooch, shews that the circulation, after tying a principal artery, is sometimes carried on by extreme small vessels at first; and that, though the blood with difficulty finds its way into the usual channel, yet a small degree of circulation is sufficient to prevent a mortification; and that nature accomplishes this work in time.—“ After having laid
“ the carotid artery bare in a horse, about four inches just
“ above the breast, I continued the incision near six inches
“ up the neck, putting a ligature round the lower part of the
“ vessel, and another three inches higher, cutting out the in-
“ termediate part of it between the ligatures, and then ob-
“ served a very strong pulsation against the lower ligature.
“ When I had gently pressed the blood downwards, and
“ emptied that part of the vessel a little way, I put on an-
“ other ligature, tying it no straiter than just to bring the
“ sides of the canal into contract, in order to abate the force
“ of the circulating fluid therein against the principal liga-
“ ture, without which precaution our design might have mis-
“ carried.

“ Dry lint, and flour, were applied to the wound, to re-
“ strain the little bleeding which proceeded from dividing
“ small vessels in the operation. The dressings were retained
“ by strips of common sticking plaister, having previously
“ shaved off the hair close, a sufficient extent, and by the usual
“ treatment, the wound digested and healed kindly, without
“ any ill accident supervening.

“ When the horse rose, who had been well confined during
“ the operation, I attentively applied my fingers to the jugu-
“ lar vein, making as strong a pressure as is made by the
“ ligature in bleeding there, but found no blood in it, nor
“ could I, by a strong ligature round the neck, raise the vein
“ at all. The day after, I made trial again, but found no
“ reason

instances *) led us out of the way. For, from seeing the distribution of the arteries, when filled with wax, it has been supposed the circulation of the blood could not be carried on in the parts below, where the passage of the blood through the main trunk was stopped. Even Mr. Cheselden † was so biassed by this theory, that he could not believe the surgeon, who told him that he had tied up the humeral artery in the middle of the arm, till some time after this discourse happened, when he was convinced that this vessel was always tied above its division, in the operation for the aneurism after bleeding. And Mr. Sharp says, “ we learn from experience, that a mortification

“ reason to believe that any blood passed through the vein,
 “ nor yet the next day; but the day after that, being the
 “ fourth, the vein filled upon making the ligature in the
 “ usual manner, though but very slowly, and it was some
 “ time before it could be distinctly felt, and when fullest, the
 “ vessel yet acquired but little tension, readily yielding to the
 “ finger upon pressure. Two days after, it rose and filled with
 “ blood much quicker, and, in a few days, as soon as the
 “ vein on the other side of the neck, continuing to do so as
 “ long as the horse lived, whom I had killed some weeks af-
 “ ter the wound was perfectly healed; and upon strict investi-
 “ gation, could then discover nothing worthy notice. But it
 “ may not be amiss to observe, that the horse did not visibly
 “ suffer in any of his faculties, in consequence of this opera-
 “ tion, who had long been affected with an incurable dis-
 “ ease.”

* About the dislocation of the thigh; about trepanning upon the longitudinal sinus; and about cutting through the sphincter ani, &c. all which, practice put to rights.

† Le Dran's Op. p. 456.

“ is

“ is seldom the consequence of tying the artery
 “ in the arm, though it should, from appear-
 “ ance, be the perpetual one. These aneurisms
 “ following always upon bleeding the basilic
 “ vein, must necessarily be aneurisms of the hu-
 “ meral artery, an inch at least above the divi-
 “ sion, which being obstructed by the ligature,
 “ one would think, must necessarily bring on a
 “ mortification, but *we see the contrary* * ;” as
 every body knows from their own experience ;
 and we no longer have the amputating instru-
 ments in readiness, apprehending want of suc-
 cess †. Nor can stronger facts be required to
 shew, that amputation is not always necessary in
 wounds of the larger vessels, which convey blood
 through the limb ; which leads us to reflect, that
 it is the business of anatomy to teach the nature
 and situation of the parts ; and of practice, how
 far, and in what manner they may be cured,
 when injured, or diseased : and accordingly,
 Paulus ‡, Parey ||, and some others, who were
 guided by practice only, speak of tying the artery
 in an aneurism as a certain cure. If the hume-
 ral artery can be tied in the middle of the arm
 without inconvenience, why may not the crural
 artery be tied in the middle of the thigh, with
 the same prospect of success ? for are not, as Dr.
 Tissot observes, the collateral branches in the
 thigh, like those in the arm, proportioned to the

* Chirur. Treat. ch. 37.

† Ed. Med. Ess. vol. II. p. 228.

‡ Lib. ii. cap. 37.

|| Lib. vii. cap. 32.

size of the member? Marcus Aurelius Severinus, De Efficac~~as~~ Medicina, part ii. fol. edit. /i
 page 46. records a case at which many of the faculty were present, where a bullet, which passed through the thigh, tore asunder the crural artery, about eight fingers breadth below the groin. Thirty days after the accident, when the patient's health was greatly injured, and every thing had a desperate appearance, the vessel was tied; but the ligature was removed on the fourth day following the operation, that it might not occasion putrefaction; yet the hæmorrhage was effectually suppressed, and the patient was cured in six weeks. Mr. Saviard gives us an instance, Obs. 63, though not quite so circumstantially related as might have been, where the crural artery being wounded, seems to have been tied in the superior part of the thigh. The surgeons concerned were under terrible apprehensions, that all the lower parts would mortify, by the interception of the blood that was necessary to nourish them; but the event here, as well as in the arm, shewed the difference betwixt *theory* and *practice*, for the patient was perfectly cured, without interruption, in six weeks from the time of the operation. In Mr. Burchall's case *, there cannot be any doubt but the patient's life and limb were preserved by tying the femoral artery. Had Mr. Leslie of Cork † preferred the *theory* of his colleague to experiment, their patient must unnecessarily have spent

* London Med. Inq. vol. III. p. 106.

† Med. Comment. vol. II. p. 176.

the remainder of his days with one leg only. But we see, notwithstanding the ligature round the crural artery was made very high in the thigh, how readily the part was cured. I myself have tied it five inches above the knee at least, after which the blood instantly returned by the large veins in the ham, which were also divided. All which would encourage me to attempt the cure of an aneurism in this part by ligature, were it to present itself under favourable circumstances. Nor do I think the reasons Dr. Tissot has advanced in favour of this practice are to be disregarded; because, what he says about the collateral branches anastomosing with the main trunk, and by this means carrying on the circulation, is known to be true; and perhaps it is the use of a few inches only of the artery, after some time, that is in general lost.

Perhaps it may be said, success in these instances was probably owing to a division in the artery higher than its usual place; and that we ought nevertheless to amputate, on a supposition that this *lusus naturæ* does not exist. But if the recovery depended upon this circumstance, a coldness and want of pulse (for a time) below, would not follow successful operations; nor could success so constantly attend the ligature, when applied at the usual place in the arm. I believe, from the slowness with which the blood often at first gets through the parts below the ligature, that the circulation is more frequently carried on by extreme small vessels, which anastomose through
the

the whole limb, and are fully sufficient for the purpose, when the passage of the blood through the main trunk (except at its entrance) is suppressed. But to have a clearer idea of this matter, I recommend a view of Mr. Cheselden's plate, taken from Le Dran's Operations, p. 456, and to my friend Mr. White's Dissection * of an arm, where the operation for the aneurism had been performed, in which will be seen the power of nature in dilating the capillary arteries, and continuing the circulation, when the passage through part of the principal artery is destroyed. The dotted lines at A, plate 1. express the obliteration of the trunk of the artery; the figure B, plate 2. shews Mr. Cheselden's opinion about the part where the ligature is made, in the common operation for the aneurism in the arm; and C are the arteries belonging to the thigh. If the circulation is carried on in one instance, when the main trunk is tied, why not in the other? And if we figure to ourselves the ramification of these arteries, and remember that they anastomose with each other all over the limb, we shall easily see how it comes to pass.

A more powerful argument against performing the operation for the aneurism in the thigh, may be the ill success which has attended it in the hands of first rate surgeons; the event having always been fatal, attended with excessive pain, a high degree of symptomatic fever, great tension

* Cases, see Plate.—There is a similar instance in Morgani, De Sed. et Causis Morb. tomus II. fol. ed. epistol. 50. art. 7, & 8. p. 230.

of the whole limb, rapidly tending to gangrene, and ending in mortification (both upwards and downwards) having destroyed all those, they have seen, on whom the operation of tying the artery was practised. Nor did they ever see any other operation than that of amputation, which preserved the life of the patient. But perhaps these instances, whether in the thigh or ham, were all old aneurisms, which had pressed against the neighbouring parts for a considerable time; and possibly, the lower part of the limb was become, by the pressure of the extravasated blood, and by the obstruction to the circulation, considerably loaded, and swoln, unfit for use or motion, and generally very painful; in which state the very vessels that should carry on the circulation, after the principal artery is tied, are obliterated, and mortification seems to be an unavoidable consequence: whereas, in the cases before recited, the wounds and aneurisms were recent, the collateral branches, and the small vessels connected with them, were capable of giving passage to the blood, and the patients were cured; from which it is rational to conclude, that when the disease is not of long standing, the patient may be cured without amputation, but that amputation is the only remedy, when it has made the progress last described.

The same may be said in wounds of the arteries. For though we imagine the limb may in general be saved by the collateral branches, after the principal trunk is tied, yet it sometimes happens,

pens, that the passage of the blood through these vessels also is interrupted from the violence of the injury, or the subsequent swelling. A poacher, by accident, was shot through the upper parts of the biceps muscle in his left arm, by a horse-pistol, loaded with very large shot, and the humeral artery was torn to pieces. The bleeding was stopped in consequence of laceration, and the whole arm was most violently bruised, from the pistol being close to it when it went off. A violent swelling, which stopped all kind of circulation in the lesser vessels, had they been capable of doing their office, succeeded, and he was dying of a mortification on the third morning, when I saw him. Whereas, in the cases mentioned to Mr. Cheselden, the artery was probably divided with but little other injury, and therefore amputation may or may not be required, as circumstances occur, or as the accident falls under the predicaments mentioned.

Fifthly, “ *An incurable caries of the bone.*”

“ Which incurable *caries*,” we are told, Dr. Bilguer says, “ ought not to be amputated, because there is a method of curing it.” And that, “ if this was merely a blunder in language, “ and went no farther, it would be a matter of “ little importance ; but it is a serious piece of “ advice, delivered authoritatively, and by a “ writer who professes to correct the errors both “ of his predecessors and contemporaries, therefore it should not be merely laughed at ; and “ as it is an advice which is not built on fact,

“ and which is fraught with mischief to mankind,
“ ought to be contradicted.” Though I have examined his book with proper attention, I can nowhere find him so ridiculous as he is here represented to be, or even a tittle like what we are taught to believe he has said. It is true, indeed, in the paragraph immediately succeeding the whole six articles, he says, “ his treatise contains an account of the methods he successfully employed “ in the military hospitals, for the *relief* of the “ above disorders,” without distinguishing this fifth article from the rest. But can his saying, that he has successfully *relieved* incurable disorders, do any mischief to mankind? especially as in the 38th and 39th sections, where he treats on this subject, his meaning is fully explained, without any blunder to be laughed at, and without giving any serious piece of advice, to do what cannot be done.

The question with him is, whether the limb may not be saved by removing the carious bone only? And that he may consider this matter properly, he sets it in two points of view. In the first, he adverts to a *caries*, when it is recent and inconsiderable; and though his theory may not quite square with the English theory, or perhaps may not be quite right; yet, if the method of cure he proposes be proper, he will not have done much mischief, by supposing that foul bones fall off from being dry, instead of being pushed off by the new flesh, arising betwixt the living and dead parts; because, keeping a foul bone dry, is certainly

tainly one way of removing the impediments to nature, and, no doubt, assists the exfoliation of bones : and the powders of mastich, myrrh, &c. which he prefers, correcting the ichor about the bone, by converting it into a tincture, renders it incapable of protracting the disease.

In the second, he treats of those cases where the best applications fail, and where the *caries* is *very extensive* ; and when a bad habit, should there be one, is corrected, instead of amputation, he thinks we ought to trepan “ the bone in several “ places, till whatever is rotten be taken away ;” and not despair of a cure, although the *greater part of the bone* be carious, because it is proved by the cure of the accidents he refers to, that the *callus* frequently fills up the whole vacuity left by the part of the bone taken out, however considerable it may have been. Most, or all of the cases alluded to, have been long known to the faculty : yet, instead of making these hints of nature useful lessons, they were looked upon as miraculous recoveries, never to be attempted by art. Has not the success attending the sawing off the head of the *os humeri*, in our own country *, evinced that we have sometimes been too hasty in taking off the arm at the shoulder ? There is now in this neighbourhood of Burton upon Trent, a man, where the head of this bone, and several inches adjoining to it, came away of itself, when he was a boy. The ulcer was cured by a common apo-

* Mr. Bent's Case. Med. Comment. Mr. White's Cases.

thecary. The man has a useful arm. The *cicatrix* now shews the greatness and extent of the disease; and nature herself has, in this instance, clearly pointed out the steps which ought to be taken, instead of taking off the limb.

Almost every surgeon must have seen recoveries with great loss in the long bones. Nor can they forget the remarkable cases * upon record, where the loss of the *tibia*, and the greatest part of the thigh bone, were supplied by a *callus*. I have seen the whole *tibia*, in a lad who came to me from Walton upon Trent, regenerated in the same manner. And I took the whole thigh bone, except its extremities, out of a lad eleven years of age, who next morning, in coming to be dressed, ran away on both his legs, as fast as most lads, and cured himself afterwards with dry lint. But it must be observed, all these regenerations happened in youth, and were the work of time. The nimble-footed gentleman, just mentioned, first complained of his thigh at two years old; a caries quite through the bone, of considerable extent, afterwards appeared; amputation was proposed, but not submitted to; and the family contented themselves with keeping the part as clean as they could, for more than nine years, when I was desired to see him, at a gentlemans house, to which I was called, in Warwickshire. In this length of time, the lower end of the bone being pushed up

* Scultetus Arment. Chirur. Obs. 81. Ed. Med. Ess. | *ma*
vol. I. p. 191. vol. V. p. 370. Med. Obs. Lond. vol. II.
p. 299.

by the *callus*, had made its way out, a few inches above the knee. Upon examining, I found it loose, and drew it away with the utmost ease, being of the size it ought to be in a child of two years old. It appeared to have separated at its connections with the *epiphyses* at each extremity, and the *callus*, which supplied its place, felt much thicker than the bone in the other thigh, but not impeding the action of the limb in the least.

In the other boy, with the diseased *tibia*, I had more trouble. It had been several years carious before I saw him, and the leg had been condemned by several surgeons; but upon calling to mind the case in the Edinburgh Medical Essays, I attempted the cure, by enlarging the foul ulcers, which had arisen in several places all down the leg, and laying the bone bare; and by degrees, with the common method of treating foul bones, the whole *tibia*, except its ends, came away, leaving a good *callus* behind, which did the office of a regular bone. Since this, in young people, where I ran no hazard of losing my patient by the discharge, or by a colliquative fever from absorbed matter, I have endeavoured to prevent the spreading of the disease, and committed the remainder of the work to time and nature, and commonly with good success; even though the thigh-bone, in a boy eight years old, for instance, was so thoroughly rotten, that it broke in two, and hung perfectly loose, farther than being supported by splints, for a great length of time. The parents kept the
fores

fores clean, washing the matter out of the sinuses about the bone, with an antiseptic injection, daily; and in less than three years time, about four or five inches of the whole substance of the *os femoris* came away. But before this period a *callus* had formed, as the lad could walk about; and a perfect cure was the consequence of time and patience. All which, I imagine, will not appear new to those who have had a considerable share of practice. Nevertheless, these instances are additional hints from nature, that prove a *callus* will be formed, and supply the place of a bone, when the greatest part of the original bone is cut away, or thrown out by exfoliation; which is all that Dr. Bilguer asserts. And whoever has any doubt about this matter, I wish they would call to mind Dr. Mackenzie's and Dr. Hunter's * papers and drawings upon this subject.

Perhaps it may be said, all this is well known, and no ways applicable to Dr. Bilguer's fifth article, which means a bone foul inside and out, from end to end: but why this should be imagined, may be difficult to guess, unless we suppose no bones are incurable but such as are in this predicament. Nevertheless, the account we have given agrees perfectly with what he has said, in explaining himself on this matter. It is a caries in *the greater part* of the bone he encourages us to try our skill in; and he seems only to mention a cure after the

* Lond. Med. Inq. vol. II. p. 229, & seq.

coming away of the whole bone, as has been said to happen *, as an extraordinary event, to shew that though the *bone* is incurable, the *limb* may be cured.

Now, considerable regenerations in bones have happened in people past the meridian of life, but I do not at present remember in them the same kind of separation and recovery we have before spoken of, in spontaneous diseases of this part of the body. Nor could those advanced to this period, think of lying by several years, for a recovery; whereas in youth, time is not of the same consequence, and they may wait longer in hopes of a cure. However, whether the patient be young or old, if the disorder in the middle of the long bones is local, exfoliation, or the removal of the bone, cannot be procured, and the disease is likely to destroy the patient soon, by bringing on a colliquative fever, that cannot otherwise be remedied, amputation undoubtedly ought to take place; and the necessity of this operation, for the same reason, more particularly happens in scrophulous joints, of which Dr. Bilguer has not taken any notice. Yet even in this instance, limits should be prescribed.

When *all* the heads of the bones in a large joint become rotten, the ligaments thickened, and spoiled, and the air gets admittance, a horrible scene of pain, fever, and their attendants, soon

* Perhaps they have more frequently separated at the epiphyses: however, it is not a clear point, but the whole bone coming away, its place might be supplied with a callus, in some instances.

puts us upon removing the diseased parts. On the contrary, when the pain and fever are neither of them so violent, as to endanger the life of the patient, I apprehend most surgeons, though they were convinced of the bones being foul, would wait and see whether an *anchylosis* might not happen, as in young people, it is very well known, the disease has sometimes terminated in this manner.

Again, a distinction should be made betwixt all the heads of the bones composing a joint, and part only being diseased ; for in the latter instance, relief may, we see, probably be obtained, without taking off the limb. But the method is not by restoring the internal and medullary parts of the bone to its sound state, or by reuniting loosened epiphyses, but by taking all the rotten bone away, and by suffering nature to supply the place in the best manner she can. Indeed, so ridiculous a supposition, as restoring by art the medullary parts of the bone to its sound state, or of reuniting loosened epiphyses, I do not remember to have met with till very lately ; and I hope it is not meant, by advancing impossibilities, to set rational attempts to preserve limbs, in a ludicrous light. We have before taken notice of the practice of sawing off the head of the *humerus* ; and as the lower end of this bone at the elbow, the lower end of the *radius* at the wrist, and the lower end of both *tibia* and *fibula*, at the ankle, have been taken away when carious, in accidents, why may we not proceed in the same manner, when they are be-
come

come carious by disease? When the upper end of the tibia and fibula are the only bones carious in the knee, we believe a cure will always be accomplished by their coming away; because we have invariably, in several instances, seen this happen, where an abscess has formed and left a convenient drain for matter, or where an opening has been made suitable for this purpose, and care taken not to irritate the part. For, of all other diseases, these are most affected by whatever frets; and a limb, which would never have been rendered incurable by the disease, may soon be lost by any application which irritates and inflames. Whereas, if the part is strengthened, and rendered less irritable, the foul bone will gradually make its way out in time.

From experiment upon a dead subject*, it is not doubted, but the sawing off the head of the *os femoris* at the hip-joint, might be performed upon a living subject with great prospect of success; and would, no doubt, be preferable to the operation of taking off the thigh at this part†. But either of them, I believe, is very seldom neces-

* Mr. White's Cases in Surgery, p. 66.

† There is an instance in the Philos. Transf. No. 466. p. 270. of an abscess in the articulation at the hip, of a girl fourteen years of age, which broke, and the surgeon afterwards dilating the opening made by nature, extracted the whole head of the *os femoris*. By injecting tincture of myrrh, and using a bandage, she was cured in six weeks, so that she could walk freely, though with halting. And if nature could make so complete a cure, by forcing off the head of the bone, why should not art, when necessary, imitate her?

fary ; for though the upper part of the thigh-bone be very foul, yet if we attend to strengthening, and lessening the irritability of the circumjacent parts, it will by degrees work its way out. But we have no instances, that I know of, which shew that the lower part of this bone at the knee, supposing it to be the only part carious from a scrophulous taint, could be removed in the same manner with advantage to the patient ; and if the symptoms from it endanger his life, I am fearful amputation will still be the best remedy.

“ Sixthly, *If any part is attacked with a cancer, or in danger of being so, it is customary to take it off.*”

This, Dr. Bilguer admits, is right, when the disorder is recent ; but if it is put off from time to time, he says, it accelerates death, or the virus falls upon another part, which is often true. Nevertheless, I do not think the success from the operation depends altogether upon the disease being recent, or of long standing, but upon its being local ; because it not unfrequently returns, when the schirrhus is removed in its infancy. And yet a perfect cure is frequently accomplished, when it has gradually made its appearance for several years, probably owing to its being so circumstanced, as not to communicate its virus to the neighbouring parts. I take it to be a glandular disease *sui generis*, and, like the scrophula, for instance, sometimes affecting a gland or glands, in one part only, and sometimes many in the body at the same time. Sometimes a schirrhus is encysted, so
as

as not to have any communication with the neighbouring parts; at others, there is no obstruction to its virus being diffused and absorbed; and upon these differences the fate of the patient seems to depend. But unless it is local, the operation cannot take place with prospect of success; and perhaps the best we can do under such circumstances, notwithstanding what has been said of hemlock*, is to remember the caution of Celsus, that the disease be not irritated by imprudence, but that such mild remedies be applied, as will sooth, or, as we now say, lessen the irritability of the part. Even the practice of keeping a schirrhous warm, by the application of hare-skin, and the like, manifestly increases, while a topical cold

* I think it is now generally allowed, that hemlock is not successful in the cure of cancers; and I have had a late instance in a woman out of Northamptonshire, where, by irritating, it manifestly increased a cancer in the breast. By her own account, she took, in various ways, for almost a year together, an incredible quantity of this remedy, and a hemlock poultice was applied to the affected part at the same time. Never was greater excoriation, and not only upon the breast, but even upon her side, where the cataplasm had lain, cancerous excrescences arose, resembling unripe mulberries. If a remedy ever did mischief, it certainly did mischief in this instance; and whoever examines properly a true schirrhous, or a cancer, after it is removed from the body, must give up their senses, if they can be made to believe, that it ever cured either of these complaints. An induration, indeed, which has been mistaken for a schirrhous, may have disappeared under its use, and continued it in practice: but this is a very different complaint, admits of cure by a variety of remedies, and is no reason for our losing time, in a disease where it cannot do any good.

bath,

bath, in general, keeps back the disease. And thus ends my comment on a writer, who, I find, has been very little read in this country. Perhaps the key I have given may raise a curiosity in some to look him over; and I will venture to say, that a thinking mind will receive advantages from many things in his work which I have overlooked, because they are foreign to the plan in pursuit.

R E C A P I T U L A T I O N .

FROM the whole of what has been said, it seems to appear :

First, That in mortifications which spread to the bone, amputation, when necessary, should not take place, till we can apply the saw betwixt the living and dead parts; and that this mode of amputating in this instance should, if possible, be preferred.

Secondly, In compound fractures of the long bones of the extremities, we should act on the side of probability. If there is a probability of the limb being saved, we should attempt to save it; but if there is no hope of a cure without amputation, it should take place without loss of time,

time, giving preference, as often as opportunity offers, to the method of removing the limb at the injured part; and in all this we should be directed by experience, without suffering ourselves to be guided by conjectural reasoning, or to be alarmed with the frightful appearance of a desperate case.

Thirdly, If compound fractures of the joints do not come within the predicament in p. 4, and the head or heads of the bone can be conveniently taken away, or if there is a large opening, so that no matter can lodge, or air be confined, a cure will often, or for the most part, happen. Whereas, if great suppuration in the membranes and tendons, with foul bones, and a colliquative fever, follow, amputation of the limb will generally be unavoidable, to preserve life.

Fourthly, If care has not been taken to preserve the patient's strength, and the strength of the limb, in compound fractures, from the beginning, and after several weeks, he should be in the state mentioned at p. 26. we may be obliged to have recourse to amputation, as a doubtful remedy is better than none.

Fifthly, Daily experience, and the concurring testimony of eminent men evince, that violent contusions in the soft parts, with shattered bones, unaccompanied with a wound, may mostly be cured without amputation.

Sixthly, It is not necessary to amputate on account of a wound, or a simple division of the main trunk of an artery, carrying blood through a limb, except it be made above where the vessel sends off collateral

collateral branches; and when this happens in the *axilla*, it should, seemingly, take place, to prevent a mortification. The same may be said in recent *aneurisms*, arising from injury done to the artery. But in old *aneurisms*, or in wounds of the principal trunk of the arteries, where the collateral branches are at the same time so obstructed from the injury, that a circulation cannot be carried on, timely amputation may prevent mortification, and preserve the life of the patient.

Seventhly, In a caries of the cylindrical bones, the limb may be preserved, although the greatest part of the bone be taken away. Even where the heads of the bones in a joint are foul, but unattended with pain, or fever, that may endanger the life of the patient, we may wait with patience in hopes of an anchylosis taking place. And when only one side of the joint is affected, we may most frequently cure the patient without the loss of the limb, by removing the diseased bone.

On the contrary, if the exfoliation or removal of the long bones cannot be procured; ~~after~~ a colliquate fever remedied by dilatations, proper dressings, and proper internal medicines; or where the heads of all the bones in a joint are become foul, the ligaments, &c. thickened and spoiled, and great pain, fever, and their attendants, invade the patient, amputation must take place, or he will probably die.

Eighthly, In local *schirrh* extirpation will be successful, but when glands are schirrhous in several parts of the body at the same time, or when the
the

the whole body is contaminated by the absorption of cancerous virus, from a local schirrhous, or cancer, death only can be expected. Besides these, there are other diseases, such as different kinds of anomalous tumours, &c. which may so perfectly destroy the limb upon which they are seated, that nothing but the removal of it can do service. But we again insist on what we first principally contended for, that in private country practice, where the limb is properly treated, gangrenes, or a great discharge of matter in bad compound fractures, are seldom fatal; that amputation is very rarely necessary in these accidents. And we think those must have been very unfortunate, whose experience has led them to be of a contrary opinion.

A
S H O R T E S S A Y
O N T H E
U S E O F O P I U M
I N
M O R T I F I C A T I O N S.

THE effects of the bark in gangrenes, arising simply from inflammation and obstruction, soon induced me to suspect its use, in the beginning of mortification thus brought on. Wherefore I joined nitre along with it in these instances; and in time, being well convinced that it did harm, I laid it aside when such cases occurred, and had recourse to the antiphlogistic assistants; notwithstanding, I have still an high opinion of the use of the bark, where the disease arises from a gangrenous disposition of the juices.

It had frequently happened in the course of my practice, that I had seen opium abate local inflammation, and knowing the necessity of using a remedy that would be speedy in its effects on this occasion, I joined it along with the other antiphlogistics I employed; and after considerable experience,

rience, I am firmly persuaded it does good service in those mortifications in which the bark, by increasing the vigour and action of the solids, manifestly does injury. However, before I arrived at that knowledge concerning this matter, which repeated experience only can give, I communicated my observations to several of the faculty, with whom I had the pleasure of conversing: and in a conversation on this subject, Mr. Parrott of Birmingham informed me, many years before any thing was made public about the use of opium in mortifications of the feet and toes, that he had cured an old man of this disease, by large doses of this medicine, and that it was now become his general practice in similar instances. And I know he was free in communicating this knowledge to all his acquaintance. Since this practice has been more publicly known, I have had more frequent opportunities of learning its effects: and after giving an account of the method of treatment I have pursued, in mortifications occasioned by, or attended with high inflammation, I shall relate the observations I have made on the use of opium in the other instances in which it has been found to do service.

In mortifications arising merely from inflammation and obstruction, I have sometimes bled, more frequently purged with neutral salts, without bleeding; and on the intermediate days of purging, I have given the common saline medicines used in febrile complaints; but to all these I have joined doses of opium. In the first instance, that

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the purges might remove inflammation and obstruction, without irritating the system too much; and in the second, that the degree of irritability and heat might be lessened at the same time. But when the saline medicines were given every three or four hours, I gave only small doses of laudanum, and thus, by degrees, introduced into the habit a sufficient quantity for the purpose, without any sort of inconvenience. When the inflammation begins to abate, spirit of salt, being a cooling and powerful antiseptic, supplies the place of neutral salts. Spirit of nitre, juice of lemon, a little sugar, and a proper quantity of water, are used for common drink; and when the separation of the mortified parts begins to take place, and not before, the bark is given.

To the affected part, emollient neutralized cataplasms, which purge the skin (if I may so call it) without irritating too much*, are applied. These greatly assist in abating inflammation and its consequences. The vessels are still unloaded, if necessary, by incisions of proper length being made boldly down into the cellular membrane, &c. but to the parts which are actually mortified, antiseptics are applied, to correct the acrimony in them, and thereby to prevent, if possible, the spreading of the disease. And though it is impossible to say what share opium has in the cure,

* This may be made of the bread and milk poultice, Glauber's salts, and vinegar of lead; for, by joining stimulants and sedatives together, we lessen irritability, and unload the vessels at the same time.

yet I have not any doubt of its doing good service, for the reasons already given, and because of the speedy effects I have observed, where bark and the common methods have been found ineffectual.

I wish it could be said, that the use of opium is as frequently followed with success, in mortifications of the feet and toes; but it is impossible, as the disorder is often incurable. Besides, though under proper regulations, I believe it to be a most powerful remedy in this disease, yet it will sometimes increase it; nor is it always alone sufficient to accomplish a cure, which may be accomplished by the assistance of other remedies. Its being given in large doses will frequently frustrate our intentions; and it may also be rendered useless by improper applications to the part.

I do not remember ever seeing one instance of opium succeeding in the cure, or in the mitigation of this complaint, where fomentations and turpentine digestives were used: and I do believe, we might prescribe it to eternity without success, were no alterations to be made in these particulars; because I am very certain, fomentations, of whatever kind they may be, increase putrefaction in sores; and that in this mortification, when a red line has pointed out a disposition in the disease to stop, a repetition of the fomentation has frequently interrupted nature in her progress towards a cure, and assisted in hastening the patient to his grave, especially when aided with those dressings which invite a flux of humours to the part.

Seemingly,

Seemingly, the use of opium in this instance is in lessening the irritability of the affected part; because pain is not capable of bringing on either inflammation, or sphacelus, as pain itself evinces. And why should not our sedatives be applied immediately to the affected part? Lenients, indeed, have been recommended, and I have not the least doubt, but soaking the foot and ankle in warm milk, and applying a simple emollient poultice, is a method preferable to that commonly used; and the patient will often derive much advantage from its easing pain. Nevertheless, remedies being mild and soft, and lying easy upon the part, are not sufficient; they should not only have a property of procuring ease, by taking off tension, but they should have an innate property of lessening the irritability of the nerves; and for this purpose various sedatives may be necessary, as preternatural sensation does not always give way to the same remedy. Opium, it is true, in general lessens all kinds of preternatural irritability for a time, but the disease occasioning this affection can often only be entirely removed by the native balsams, essential oils, and the like. Pitch has a powerful sedative quality, and an ointment of thin consistence, made of this ingredient, a small quantity of wax, and a large quantity of oil, will, for the most part, be found a remedy, perfectly capable of allaying, without inconvenience, that kind of irritability which commonly prevails in this disease; and by mixing tincture of myrrh, or the like,
 along

along with it, we have a good antiseptic for the parts, where, on account of the sphacelus, antiseptic dressings are required. If a proper quantity of opium is added to the bread and milk poultice, which covers the whole, it will be found a better remedy than the simple poultice alone. In some cases, an anodyne emollient cerate, made of diachylon, the powder of marsh-mallow leaves, or linseed flour, a little wax, opium, pitch, and oil, should be preferred.

By this method of proceeding, there is less necessity for taking large doses of opium, which very frequently bring on a drunken delirium, make the patient sick, take away appetite to all kind of food, and thus do mischief instead of good, as is evident from their no way stopping the progress of the disease, when they have these effects. Whereas, small doses frequently repeated, will gradually lessen nervous irritability, without these inconveniencies. And this I can aver, that I have repeatedly seen this kind of mortification recover under the use of anodyne topics, when we were obliged to leave off giving opium, because it brought on a delirium, and took away the appetite, without producing any good effect: and it may, I think, be laid down as a rule, that unless the patient can eat a mild, nourishing food, there will be but small hopes of a cure.

The particular kind of mortification in the toes, &c. in which this treatment has been found successful, seems to be that which we shall hereafter speak of, arising from an acrimony in the juices, and
requires

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requires other medicines besides opium. I many years since read an author, I cannot now refer to, who advised mercury in the cure of mortifications in the feet and toes of old men, because, he said, they arose from the scurvy *. And some years since, being foiled in an attempt to cure a mortification in the toes and foot of an old gentleman at Retford, I communicated this information to the late Dr. Booth, who had the immediate care of the patient; and I had the pleasure of reading in a letter from him soon after, that he had recourse to a solution of sublimate, and that though the disease had spread to the middle of the foot, yet it soon stopped, after he began to take this medicine; and we followed the practice, which has been long well established, of suffering the dead parts, without scarifying, to drop off of their own accord, with perfect success. Since this, a person under my care, in a similar instance, recovered, while the sedatives mentioned were applied, and an electary taken, composed of bark, gum guaiacum, and cinnabar of antimony, after opium by the mouth had been fairly tried, without any good effect. But though we were obliged to lay it aside, on account of its disagreeing with the patient, yet small doses, in the manner described, may be joined to alteratives with advantage.

* The word Scurvy has been applied to a variety of diseases, which have no affinity to each other; and I only understand it in this instance, as a particular kind of acrimony, which mercury will correct.

Nevertheless,

Nevertheless, though we approve much of sedatives in the diseases we have described, yet there is a mortification in the feet and toes of old people, in which they appear to me to do injury. A month after a frost and snow, in January 1776, an active farmer, eighty years of age, was seized with a black spot upon the end of his great toe : presently the cuticle began to separate, and a sphacelus, in some time, extended itself to the foot, and neighbouring toes, till they were all destroyed. During the progress of the disease, the fairest trial was given to opium. At first he took a grain twice a day, presently double this quantity, then the same dose every four hours, and afterwards oftener, for a month ; but the disorder daily gained ground under mild applications, and his health became so greatly injured, that we suffered him to return home, leaving off all kinds of medicines, and we had very little hope of his recovery. Nevertheless, we ordered him to drink wine, to live upon a generous diet ; and to the foot, a mild digestive, and the stale beer poultice, were daily applied ; but he gave preference to their own malt liquor, and lived in communion with the family : and thus he went on for a month at least, without any considerable alteration ; but in the end, his health amended, the mortification stopped, above half his foot dropped off, and he is now in good health. In this case, then, which comes within the description given of the mortification of the toes and feet, I am persuaded opium did harm ; and if we reflect upon the mat-

ter, will it not seem probable that it must always do harm, where nervous influence is less powerful than it ought to be? In a man of eighty, notwithstanding he was very active at that time of life, the *vis vitæ* must of course be weakened. The cold, as he told me, had a powerful effect upon both feet, and perhaps, by destroying the remains of nervous energy in one of them, the mortification was brought on, and afterwards in some degree spread, by the assistance of opium; because it stopped when the opium was laid aside, and a little vigour given to the habit. To prevent, therefore, an indiscriminate use of this medicine, in all mortifications of the parts we have been speaking of, we will more clearly, as far as our present experience enables us, distinguish the cases in which sedatives may do service, and those in which they should not be employed.

It is easy to conceive, that in people advanced in life, who have not been very temperate in eating or drinking, or in both, the juices may have acquired acrimony; and accordingly the disease in question seems sometimes to arise from this cause, accompanied with an extreme degree of irritability of the part, which may perhaps be owing to the constant irritation which such a state of the juices, when they once stagnate, must occasion: and in which state, opium and the alteratives mentioned, seem to be proper,

It begins with a black or blue spot, somewhere about the toes; the cuticle separates, a lividness appears underneath, the disease gradually extends
itself

itself to the foot, and the ulcer which follows has sometimes different appearances, in different parts, at the same time. In one part, perhaps, there is a perfect sphacelus; in another, new flesh appears; and in a third, the lips of the sore are tucked in, and seem to be constantly eaten away by a corrosive ichor. Pain, more or less, is a constant attendant; inflammation, and a swelling of the parts, is not uncommon; a most certain criterion is the sensibility of the parts of the ulcer which are alive, and the pulse is quickened in proportion to the degree of inflammation which prevails.

On the contrary, when the mortification arises from the *vis vite*, or nervous energy, being destroyed, a perfect sphacelus keeps spreading forward; the parts die apparently without corrosion, and there are no signs of an acute sensation when they are touched; all which seem to evince, that sedatives in this instance cannot afford relief. In short, wherever irritation has a share in increasing gangrene, they will be useful. When death, in a particular part, is the consequence of a deficiency in the nervous energy, warm and invigorating remedies are preferable: but when a mortification in the extremities, as often happens, comes on; where nature is worn out, and incapable of assisting us, what can be expected from art?

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